

U.S.S.N. 10/780,353

REMARKS

Applicants appreciate the Office Action of January 19, 2006, and the Examiner's clear and concise remarks contained therein. The Office Action has been carefully considered, and the only independent claim in this application (Claim 1) has been amended to improve its clarity, however the scope of the claims remains unchanged in the belief that the original claims patentably distinguish over all of the prior art of record. As will be discussed below in more detail, none of the art of record either anticipates the invention or suggests the invention claimed by applicant, even if combined.

Claims 15-43 have been withdrawn from further consideration pursuant to a restriction requirement, consequently only claims 1-14 remain under prosecution in the present application. Claims 1-6 and 8 stand rejected under 35 U.S.C. 102(b) as being anticipated by Littlejohn (US 5,539,641). The remaining claims, (7 and 9-14) stand rejected under 35 U.S.C 103(a) as being unpatenable over Littlejohn in view of Nagae (US 6,598,946). These rejections are respectively traversed for the following reasons.

The Examiner contends that Littlejohn anticipates each element of claims 1-6 and 8, and in support of this rejection, cites several passages from Littlejohn. A careful reading of these passages however, reveal that Littlejohn teaches the use of an entirely different method and system, compared to Applicants' method,

U.S.S.N. 10/780,353

which is aimed at solving a totally different problem. Specifically, the problem addressed by Littlejohn is that of maintaining equal braking torque on left and right wheels under normal driving conditions. Littlejohn's brake control method is used to reduce brake torque differences during normal braking, not under rapid, hard or emergency braking conditions such as when the vehicle's ABS is activated (see Littlejohn, col. 1, lines 45-48). Littlejohn is not concerned with the adverse effects on powertrain components produced by high levels of reactive braking torque. Moreover, Littlejohn's torque control technique is limited to adjusting braking torque at the wheels, rather than on other components of the powertrain upstream of the wheels. Littlejohn fails to recognize the problem of counter torque or reaction torque being transmitted to high inertia power train components during hard braking. Indeed, the brake control system of Littlejohn is disclosed in connection with a direct drive electric vehicle which is not equipped with numerous high inertia power train components such as multiple motors and transmissions found in hybrid vehicles.

In contrast, Applicants' claimed invention is intended to solve a problem commonly found in hybrid powered vehicles which typically employ multiple power sources connected through multiple differentials or transmissions to drive wheels. As explained in Applicants' specification, the momentum produced by these components create a high level of inertia which act in opposition to reaction torque that is created when the vehicle's brakes are rapidly applied, as during emergency braking conditions such as when the vehicle's ABS is actuated.

U.S.S.N. 10/780,353

Even if the Littlejohn brake control technique was employed on a vehicle having high inertia powertrain, the problem of high levels of reaction torque being transmitted back through the powertrain would not be solved since Littlejohn teaches, at most, reducing the amount of brake torque applied to a wheel only enough to equalize the torque applied to left and right wheels. Thus, not only does Littlejohn fail to recognize the problem solved by applicant, use of the Littlejohn technique would not solve the problem in a hybrid powered vehicle.

Applicants recognize that in order to solve the problem, reaction torque must be reduced upstream of the drive wheels to which brake force is being applied. Applicants disclose several techniques for reducing the reaction torque by partially or completely disconnecting high inertial powertrain components upstream of the drive wheels.

Claim 1 has been amended to more clearly recite the problem solved by Applicants' method, namely, controlling reaction torque transmitted through a high inertia vehicle powertrain during a rapid braking event. Amended claim 1 now calls for detecting a rapid braking event in which a brake force produces reaction torque that is transmitted from the drive wheel through the high inertia powertrain. Further, amended claim 1 now calls for reducing upstream of the drive wheel in the powertrain the reaction torque produced by the applied brake force. Neither Littlejohn nor any of the other art of record teaches these

U.S.S.N. 10/780,353

significant features of the invention. While Littlejohn teaches adjustment of brake torque on a wheel in order to equalize braking torque, this reference fails to teach the limitations mentioned above. Clearly, Littlejohn does not anticipate the invention embraced by amended claim 1 under 35 U.C.S. 102 (b). Moreover, a rejection of claim 1 as amended is believed to be improper under 35 U.C.S. 103(a) since Littlejohn fails to either recognize the problem solved by applicant or suggest a solution for avoiding the adverse effects of reaction torque during sudden braking events.

The rejections of claims 2-6 and 8 based on Littlejohn are likewise believed to be misplaced because the system in Littlejohn does not sense sudden braking events; on the contrary, the Littlejohn brake control system is rendered inoperative in sudden, emergency braking situations as when the ABS is actuated. Applicants' claimed invention is directed toward detecting the existence of emergency or severe braking events, not minor differences in the brake torque applied to left and right wheels.

For the foregoing reasons, it is submitted that the rejection of claims 1-6 and 8 based on Littlejohn is an error and should be withdrawn.

With respect to the rejection of claims 7 and 9-14 on grounds of obviousness, the examiner contends that Nagae teaches disconnecting and reconnecting a drive wheel from a powertrain in relation to actuating a clutch, and

U.S.S.N. 10/780,353

that it would be obvious to combine the teachings of Nagae with Littlejohn to arrive at Applicants' claimed invention. This rejection is respectfully traversed.

In fact, Nagae teaches connecting and disconnecting a clutch that connects front drive wheels to the vehicle's primary transmission via a differential, while the rear wheels remain engaged with the powertrain. The purpose in disconnecting the front drive wheels is to aid in brake control used to stabilize the turning behavior of the vehicle. Thus, Nagae teaches, at most, disconnecting one set of drive wheels in a four-wheel drive vehicle for the purpose of stabilizing turning behavior. It is respectfully submitted that those seeking a solution to the problem of controlling reaction torque in a high inertia power train would not be motivated to use the teachings of Nagae in the powertrain shown in Littlejohn, since any motivation supplied by Nagae would be to control turning behavior, rather than reaction torque in the powertrain.

Furthermore, the hypothetical combination of Littlejohn and Nagae do not meet the limitations of the claims, even if combined. For example, neither Littlejohn nor Nagae teach allowing the clutch to slip such that only part of the torque applied to the power train by the drive wheels is reduced (claim 10), or comparing a speed of a drive wheel with a speed of the powertrain and adjusting the powertrain speed to a pre-selected range based in part on the drive wheel speed (claim 14). These important limitations cannot be ignored in making a determination of obviousness. Accordingly, it is believed that the rejection of

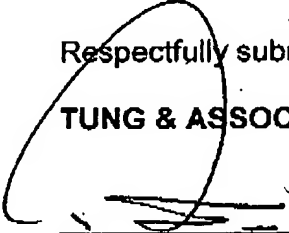
U.S.S.N. 10/780,353

claims 7 and 9-14 based on the combination of Littlejohn and Nagae is an error, and should be withdrawn.

Reconsideration of the rejections is respectfully requested in view of the instant amendment and foregoing comments. If the Examiner believes that direct communication with Applicants' attorneys would advance the prosecution of this case, he is invited to telephone the undersigned. Applicants believe this case is in condition for allowance and such action is courteously solicited.

Respectfully submitted,

TUNG & ASSOCIATES



Randy W. Tung
Reg. No. 31,311